

6.3 Practice A

In Exercises 1–3, rewrite the equation in exponential form.

1. $\log_2 8 = 3$

2. $\log_7 7 = 1$

3. $\log_5 25 = 2$

In Exercises 4–6, rewrite the equation in logarithmic form.

4. $4^2 = 16$

5. $5^0 = 1$

6. $6^{-1} = \frac{1}{6}$

In Exercises 7–12, evaluate the logarithm.

7. $\log_2 16$

8. $\log_5 125$

9. $\log_6 6$

10. $\log_5 \frac{1}{5}$

11. $\log_9 1$

12. $\log_2 \frac{1}{8}$

In Exercises 13–15, evaluate the logarithm using a calculator. Round your answer to three decimal places.

13. $\log 5$

14. $\ln 14$

15. $\log \frac{1}{4}$

16. The decibel level D of sound is given by the equation $D = 10 \log \left(\frac{I}{10^{-12}} \right)$, where I is the intensity of the sound. What is the decibel level when the intensity of the sound is 10^{-9} ?

In Exercises 17–19, simplify the expression.

17. $5^{\log_5 x}$

18. $8^{\log_8 2x}$

19. $\log_4 4^{3x}$

In Exercises 20–25, find the inverse of the function.

20. $y = 1.1^x$

21. $y = 3^x$

22. $y = \log_3 x$

23. $y = \log \left(\frac{1}{3}x \right)$

24. $y = \ln(3x)$

25. $y = e^{5x}$

26. The wind speed s (in miles per hour) near the center of a tornado can be modeled by $s = 93 \log d + 65$, where d is the distance (in miles) that the tornado travels.
- A tornado traveled 35 miles. Estimate the wind speed near the center of the tornado.
 - The wind speed near the center of a tornado was 150 miles per hour. Find the distance that the tornado traveled.

6.3 Practice B

In Exercises 1–3, rewrite the equation in exponential form.

1. $\log_9 1 = 0$

2. $\log_6 216 = 3$

3. $\log_2 \frac{1}{4} = -2$

In Exercises 4–6, rewrite the equation in logarithmic form.

4. $13^{-2} = \frac{1}{169}$

5. $4^{3/2} = 8$

6. $81^{1/2} = 9$

In Exercises 7–12, evaluate the logarithm.

7. $\log_8 64$

8. $\log_2 32$

9. $\log_{10} 1$

10. $\log_3 \frac{1}{81}$

11. $\log_2 0.125$

12. $\log_{10} 0.01$

In Exercises 13–15, evaluate the logarithm using a calculator. Round your answer to three decimal places.

13. $\log\left(\frac{1}{5}\right)$

14. $2 \ln(1.4)$

15. $\ln(0.4) - 2$

16. The decibel level D of sound is given by the equation $D = 10 \log\left(\frac{I}{10^{-12}}\right)$, where I is the intensity of the sound. The pain threshold for sound is 125 decibels. Does a sound with an intensity of 10 exceed the pain threshold? Explain.

In Exercises 17–19, simplify the expression.

17. $e^{\ln 7x}$

18. $10^{\log 18}$

19. $\log(10^{3x})$

In Exercises 20–25, find the inverse of the function.

20. $y = 0.75^x$

21. $y = \log_{3/4} x$

22. $y = \log\left(\frac{x}{2}\right)$

23. $y = \ln(x + 2)$

24. $y = e^{x-3}$

25. $y = 6^x + 2$

26. The length ℓ (in inches) of an alligator and its weight w (in pounds) are related by the function $\ell = 27.1 \ln w - 32.8$.
- Estimate the length (in inches) of an alligator that weighs 250 pounds. What is its length in feet?
 - Find the inverse of the given function. Use the inverse function to find the weight of a 14-foot alligator. (*Hint:* Convert to inches first.)